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THE RELATIONS OF THE PERITONEUM TO THE
DESCENDING COLON IN THE HUMAN SUB-
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NOTWITHSTANDING the importance of this subject from a surgical point of view, and also its developmental interest, the fate of the primitive descending meso-colon, and the relative frequency of the existence of a mesentery for the descending colon during the later months of foetal life and after birth, are questions upon which anatomists are by no means agreed.

It is unnecessary for me to attempt an exhaustive resumé of the literature on this subject, as this has already been done by Professor Toldt¹ in a very able and interesting communication. Since Toldt's paper the most important work dealing with this subject is that by Mr Frederick Treves. I refer to his *Hunterian Lectures on the Anatomy of the Intestinal Canal and Peritoneum in Man*, 1885. Mr Herbert W. Allingham, in a recently published work on *Colotomy: Inguinal, Lumbar, and Transverse*, gives the result of some original investigations that he has made on the relations of the peritoneum to the colon, and numerous references to this subject will be found in papers dealing with inguinal *versus* lumbar colotomy.

My own investigations are based mainly upon a study of the relations of the peritoneum to the descending colon during the latter half of foetal life, but they have an important bearing upon its condition during extra-uterine life.

It is generally admitted that the descending colon gradually shifts its position from near the middle line, so that in foetuses from 3 to 6 inches in length it is usually found along the outer border of the left kidney, but attached by its long mesentery to the abdominal wall near the middle line. I show you a

¹ "Bau und Wachstumsveränderungen der Gekröse des menschlichen Darmkanales," *Denkschriften d. k. Akad. der Wissensch.*, Wien., bd. xli., 1879.

horizontal section through the abdomen of a foetus $3\frac{1}{4}$ inches long, in which this condition is well seen (see fig. 1). Two main views have been advanced to account for the subsequent disappearance of the mesentery, or the shifting of its attachment from near the middle line to the outer side of the kidney. Treitz, Luschka, and Hyrtl have attributed its disappearance to the growth of the abdominal wall by which the two layers of the mesentery are separated from one another at their base, and are used up in the formation of the parietal peritoneum, until finally the posterior surface of the colon loses its peritoneal covering. Waldeyer agrees with the above view, but he also thinks that the growth of the kidney is a factor in causing a disappearance of the mesentery. Langer¹ and Toldt² ascribe the fixation of the descending colon to the agglutination of the posterior layer of its mesentery with the parietal peritoneum behind it. The adhesion is at first very loose, and can easily be torn. According to Toldt, this union of the descending meso-colon with the parietal peritoneum begins above near the splenic flexure, and passes from this level downwards. The agglutination occurs readily over the kidney, as the prominence of this organ tends to bring the layers in close contact. Just internal to the kidney, however, there is a longitudinal depression, and here union often does not occur or is delayed for a few months, and hence the formation of the primitive inter-sigmoid fossa. This recess is funnel-shaped, extends upwards internal to the kidney along the course of the ureter, and opens below behind the mesentery of the sigmoid flexure. It is very commonly found in foetuses of the fifth and sixth months, and as Toldt maintains, its presence affords strong confirmation of his views as to the mode of obliteration of the descending meso-colon. In several foetuses at this age I have found on dissection appearances which seemed to be due to the adhesion of the descending meso-colon with the parietal peritoneum.

I have investigated the relation of the peritoneum to the colon, from the fifth to the ninth month of foetal life, by hardening the entire foetus in spirit or Müller's fluid. The body was injected with the hardening fluid by the umbilical vein as soon as received, and preserved in the same fluid until thoroughly

¹ *Lehrbuch der Anatomie*, Wien., 1865.

² *Op. cit.*

hardened. In some cases the hardening of the abdominal viscera was facilitated by making a transverse cut through the abdominal wall superficial to the liver, so as to allow the fluid to enter the peritoneal cavity. After the trunk was well hardened, a horizontal section was made through the abdomen at or near the level of the umbilicus. Usually two horizontal sections were made, one a little above the umbilicus in front, and passing posteriorly through the kidneys, and another at the level of the umbilicus, dividing the posterior abdominal wall below the kidneys and above the iliac crests. The relations of the peritoneum were then carefully examined in the plane of the section, and subsequently the coils of the small intestine were turned aside to permit of an inspection of the whole length of the descending colon. This plan gives excellent results, and is much less laborious than the freezing method. It appears to me essential, for a satisfactory determination of the relation of the peritoneum to the colon, that some means should be adopted so that the parts are thoroughly hardened before the abdominal viscera are exposed. I have examined, by the above method, six fetuses at the fifth month, four at the sixth, two at the seventh, two at the eighth, and five at full time.

At the fifth and sixth months, the obliteration of the primitive meso-colon and the subsequent fixation of the descending colon is usually completed where the colon lies against the outer part of the kidney. This was the case in eight out of the ten fetuses examined. In one case, a six months fetus, the upper part of the descending colon was placed external to the kidney, but as it passed downwards, the colon gradually inclined inwards in front of the kidney. It had no mesentery at its upper end, but opposite the lower half of the kidney it had a mesentery, which was attached posteriorly to the anterior surface of the kidney. This mesentery became continuous below with that of the sigmoid flexure. In the other case the descending colon had a similar relation to the kidney, but it did not acquire a mesentery until it reached the lower end of the kidney.

In the eight specimens at the fifth and sixth months, in which there was no meso-colon at the level of the kidney, only about half the circumference of the bowel was covered by peritoneum. The surface uncovered rested partly upon the kidney and partly

against the abdominal wall immediately external to the kidney. In six of these eight *fœtuses* there was no mesentery to the colon between the kidney and the iliac crest, but in two of them it acquired a mesentery opposite the lower end of the kidney. Nine specimens were examined between the seventh and ninth months of *fœtal* life, and in none of these was there a descending meso-colon either opposite the kidney or between this organ and the iliac crest, and on an average nearly half of the circumference of the bowel was uncovered by peritoneum. This was the case both in those specimens in which the colon was nearly empty and those in which it was distended with meconium. The colon passed vertically downwards along the outer border of the kidney, and at the lower end of the kidney it turned inwards to reach the outer border of the *psoas*. Here it again changed its direction, passing downwards in front of the iliac crest to join the sigmoid flexure.

Fig. 2 shows a horizontal section of the abdomen of a nine months male *fœtus*, passing through the lower part of the umbilicus in front, and the upper part of the 5th lumbar vertebra

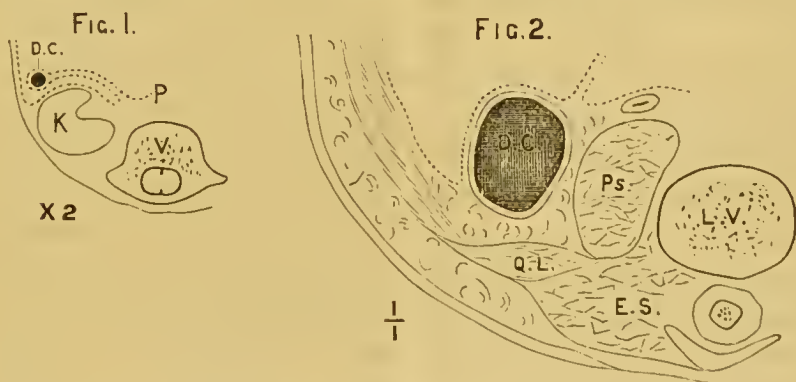


FIG. 1.—Transverse section through abdomen of a *fœtus* $3\frac{1}{4}$ inches long. D.C., descending colon; P., peritoneum; K., kidney; V., vertebra.

FIG. 2.—Transverse section through abdomen of a nine months *fœtus*. D.C., descending colon; Ps., *psoas* muscle; Q.L., quadratus lumborum; E.S., erector spinae; L.V., lumbar vertebra.

behind. It was immediately above the iliac crests and below both kidneys. Both the descending colon and the sigmoid flexure were distended with meconium. As can be seen from the figure, the inner aspect of the colon lying near the *psoas* and the posterior aspect placed in front of the quadratus lum-

borum were uncovered by peritoneum, while the anterior and external surfaces were provided with a serous investment.

The part of the circumference of the colon covered was $\frac{7}{8}$ of an inch in extent, while that uncovered was $\frac{3}{4}$ of an inch. In another case, a nine months female fœtus, the descending colon was nearly empty and flattened from before backwards. In this specimen not more than half of the circumference of the colon was covered by the peritoneum.

I am well aware that these results do not agree with those of various other observers. Lusehka¹ asserts that in the newborn child the vertical portions of the colon are completely surrounded by peritoneum, and movable, and also nearer the middle line. My results, however, agree with those of Toldt, and I believe they represent the normal relation of parts. These conclusions have an important bearing upon the question of the relation of the peritoneum to the descending colon during extra-uterine life. Thus Mr Frederiek Treves² writes—"From the standpoint of development and comparative anatomy, it would certainly be expected that a descending meso-colon would be much more frequently met with than an ascending meso-colon. It is the remains of the primary vertical fold of peritoneum, whereas the ascending colon is a secondary production, a fold required by a certain phase in the development of the bowel" (p. 55). From the above quotation it is evident that Mr Treves regards the descending meso-colon of the adult as resulting from the persistence of the primitive mesentery. If, however, the descending meso-colon of the young fœtus be normally obliterated by the end of fœtal life, it is obvious that the mesentery described by various authorities as of frequent occurrence in the adult must be a secondary formation, and not, except in rare cases, the remains of the primitive descending meso-colon.

I have not yet met with a mesentery for the descending colon, either in the child or the adult, in subjects examined after freezing the abdomen and making horizontal sections of the body in the region of the descending colon. My cases, six children and two adults, are, however, too limited in number to justify any definite opinion as to its relative frequency. In one

¹ *Die Anatomie*, bd. ii. p. 172.

² *Op. cit.*

case, a boy aged 5 years,¹ the descending colon did not occupy its normal position, but passed downwards internal to the left kidney. In this case there was no mesentery. I have notes of several cases of a similar kind in adults, and in these also there was no mesentery. In the other five children the bowel was normal in position. Pl. xi. fig. 1 of my work on the Anatomy of the Child represents a horizontal section of the abdomen of a girl six years old, made between the last rib and the iliac crest. In this case the bowel was empty and contracted, and just about one-half of the part of the descending colon divided in the section was uncovered by peritoneum.

I am of opinion that the frequency of occurrence of a descending meso-colon has been greatly exaggerated, and the methods adopted for the investigation of the peritoneal relations of the descending colon have been unsatisfactory, and in some cases have tended to develop a mesentery where it did not normally exist.

Professor P. Lesshaft² described a descending meso-colon as existing, on an average, in 1 out of every 6 bodies. Between the ages of 30 and 40 it was 1 in every 4, and between 40 and 50 it rose to 1 in 3.

Mr Frederick Treves³ found a descending meso-colon, varying in length from 1 to 3 inches, in 36 out of 100 bodies he examined. He gives no particulars as to the condition of the bowel, whether empty or distended, or the vertical extent of the mesentery.

Mr Herbert W. Allingham⁴ found a mesentery much more frequently than either Lesshaft or Treves. It may, perhaps, be as well to quote his own words. On page 153 of his work on *Colotomy* he writes:—

“In condition 2, as represented in fig. 30, the colon is entirely surrounded by firmly adherent peritoneum, and has a comparatively short mesentery, so that it is impossible to reach it, or to see the longitudinal bands, without first opening the peritoneal cavity. In this condition the ascending and descend-

¹ See fig. 8, p. 30 of my work on *The Topographical Anatomy of the Child*, 1887.

² “Die Lumbalgegend in anatomisch-chirurgischer Hinsicht,” *Reichert und Du Bois Reymond's Arch.*, 1870.

³ *Op. cit.*, p. 1.

⁴ *Op. cit.*, p. 2.

ing colons have a mesentery of varying length. My own observations show 49 out of 60 cases on the right side and 50 out of 60 on the left side, the percentage therefore being $81\frac{2}{3}$ out of 100 cases on the right side, and $83\frac{1}{3}$ out of 100 on the left side." Mr Allingham does not give any particulars as to the method he adopted in his examination, but if his facts be correct, I presume they must constitute a very serious objection to the operation of lumbar colotomy,—at any rate, as usually performed. Indeed it is difficult to realise how surgeons could have continued for so many years to perform lumbar colotomy and expect to open the descending colon without wounding the peritoneum, when, according to Allingham, this is impossible in 5 out of 6 subjects. Both Treves and Allingham made their observations upon fresh bodies, but they give no particulars as to what precautions they adopted to fix the colon and peritoneum in their normal position.

In many subjects the parietal peritoneum is very loosely attached to the abdominal wall in the lumbar region, especially where it is reflected on to the colon. This looseness of connection is what one would expect from the variations in the

FIG. 3

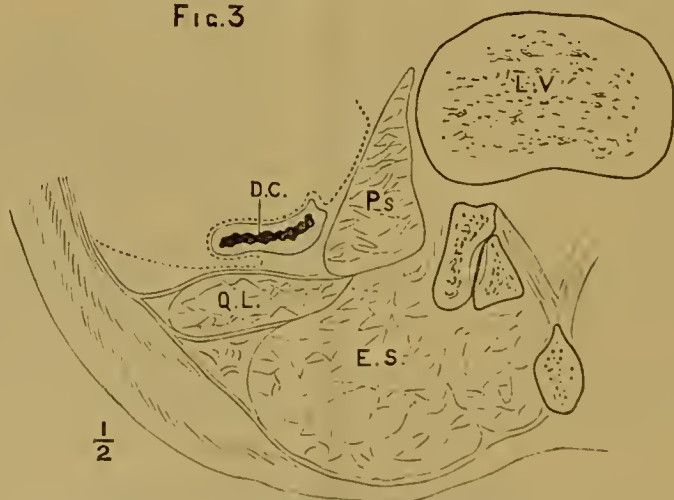


FIG. 3.—Transverse section through the abdomen of a male adult.
Lettering as in Fig. 2.

quantity of material occupying the colon at different times. It therefore follows that the colon, upon slight traction, can easily be drawn forwards from the posterior abdominal wall and a fold of peritoneum formed behind it, simulating a mesentery. It

must further be noted that the reflection of the anterior abdominal wall and the consequent division of the parietal peritoneum facilitates the formation of this fold.

Fig. 3 represents a horizontal section of the abdomen of a thin male subject, aged 57 years, half an inch above the iliac crest. The colon was empty. In a section through this body an inch higher up, which divided the lower end of the kidney, only half the circumference of the bowel was covered by peritoneum, but here fully $\frac{3}{4}$ was covered. The extent of surface uncovered was only $\frac{2}{8}$ of an inch. In this case the peritoneum covered the anterior and lateral aspects of the descending colon, and also extended round its outer border so as to cover part of the posterior surface. The peritoneum, however, was very loosely attached to the colon where it covered it posteriorly, and I have no doubt that had the bowel been distended, a much larger surface would have been uncovered by the peritoneum. It is specimens such as this which are very liable, in an ordinary post-mortem examination, to be regarded as examples of a descending colon with a mesentery.

